

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 51 year old man presents to clinic with chest pain following an injury. The patient, who works for the city, slipped and fell against a machine, striking his chest wall. His temperature is 97.8° F, his pulse is 80, his respiration 20, and his blood pressure 130/84. He has point tenderness along the left lower ribs.

Which of the following imaging studies may provide useful further information in the evaluation of this patient?

- (a) left side down decubitus plain film examination
- (b) ultrasound of the chest
- (c) rib detail films
- (d) magnetic resonance imaging of the chest

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

A 51 year old man presents to clinic with chest pain following an injury. The patient, who works for the city, slipped and fell against a machine, striking his chest wall. His temperature is 97.8° F, his pulse is 80, his respiration 20, and his blood pressure 130/84. He has point tenderness along the left lower ribs.

Which of the following imaging studies is the best next step in the evaluation of this patient?

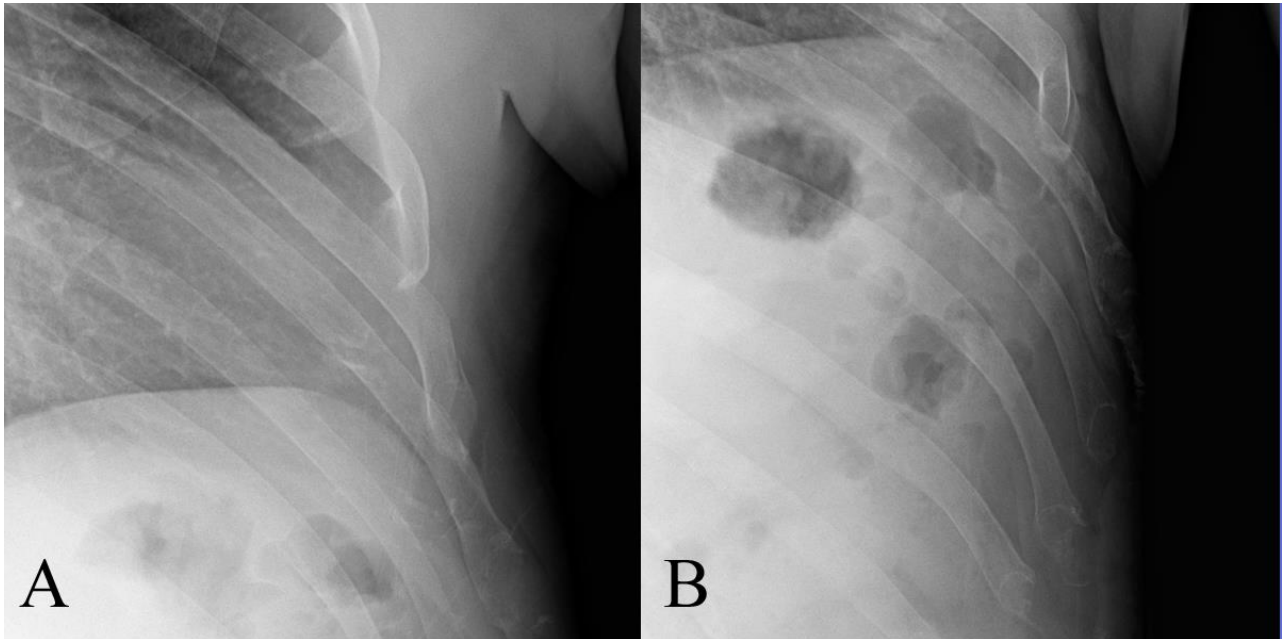
- (a) left side down decubitus plain film examination
- (b) ultrasound of the chest
- (c) rib detail films
- (d) magnetic resonance imaging of the chest

Answer: (c), rib detail films, is the correct response. While the diagnosis of a rib fracture may be based clinically on focal pain following trauma and maximum tenderness over a specific rib (or ribs), especially when accompanied by crepitus, it may be helpful in some circumstances to document radiographically that a fracture has occurred. The primary medical task is to exclude pneumothorax, pulmonary contusion, or large hemorrhagic effusion, which can be done with a routine two-view chest radiograph. If a rib detail study is done without a standard two-view chest radiograph, a PA chest radiograph should be included as part of the rib series.

A left-side down decubitus plain film might be helpful in cases where a left pleural effusion or a right pneumothorax was suspected on a supine radiograph, but not in this case, and (a) is incorrect. Ultrasound of the chest is helpful to evaluate the location and extent of a pleural effusion but is not the study of choice to document rib fracture(s), and (b) is incorrect. Magnetic resonance of the chest is rarely performed and is not the standard next step in evaluation of chest pain following trauma, and (d) is incorrect.

IMAGING STUDY AND QUESTIONS

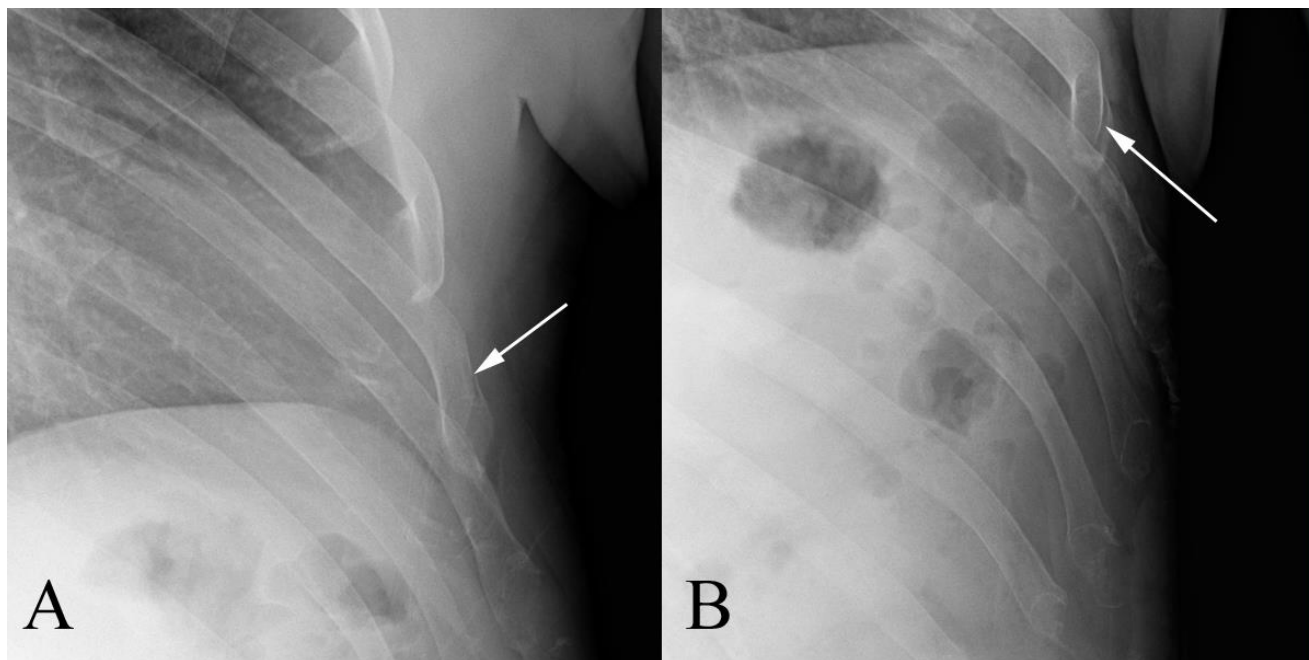
The patient underwent further imaging:



Imaging questions:

- 1) What type of study is shown?
- 2) Are there any abnormalities?
- 3) What is the most likely diagnosis?
- 4) What is the next step in management?

IMAGING STUDY QUESTIONS AND ANSWERS



Imaging questions:

- 1) What type of study is shown? Two images from a rib detail series. These are magnified and cropped. The entire series usually includes a PA chest radiograph (if one has not already been done) and multiple views of the ribs on the painful side. In this case, the PA chest radiograph (not shown) was normal, and, specifically, showed no pneumothorax or hemothorax.
- 2) Are there any abnormalities? Yes. A and B both demonstrate an acute rib fracture (arrow).
- 3) What is the most likely diagnosis? The plain films are diagnostic of a rib fracture.
- 4) What is the next step in management? As long as there is no significant pneumothorax or hemothorax, minimally displaced rib fractures may be treated symptomatically with pain medication as needed during the healing process.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP
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The patient was treated with pain medication for approximately two weeks, at which time his rib fractures were no longer painful. No further images, treatment, or follow-up were required.

SUMMARY

Presenting symptom: The patient initially presented with chest pain following trauma. The pain was not overwhelming and the patient chose to come to a walk-in clinic rather than an emergency room.

Imaging work-up: In ambulatory patients with acute post-traumatic chest pain, the initial imaging should include a plain film of the chest. The purpose of the chest radiograph is not to diagnose rib fractures but rather to exclude pneumothorax or hemothorax which may require specific procedural intervention. Rib detail images may be requested, and if these are the first study obtained a chest radiograph should be included along with more detailed views of the ribs. Rib detail views are done at varying angles and with a different radiographic technique which better displays the bones.

Establishing the diagnosis: A fracture line on plain film examination is diagnostic of an acute rib fracture. It is not always necessary to document the fracture with radiographs, and radiographs may fail to show an acute fracture even when one is present, either because of minimal fracture fragment displacement, angulation of the fracture with respect to the X-ray beam, or because the fracture is at the costo-chondral junction. Focal chest wall pain following trauma, point tenderness along a specific rib (or ribs), and crepitus to palpation are generally sufficient to secure the diagnosis.

Take-home message: When imaging is performed in ambulatory patients with chest pain following trauma, the initial study should include chest radiograph. This may be done as a dedicated chest examination or as part of a rib detail series. If the patient has no pneumothorax or hemothorax and has classic clinical features of a rib fracture (focal chest wall pain following trauma, point tenderness along a specific rib or ribs, and crepitus to palpation) it is usually not necessary to obtain dedicated rib films if a chest radiograph shows no pneumothorax or hemothorax. If there is doubt about the diagnosis or if imaging documentation is required, rib detail films may be obtained.

FURTHER READING

Meisel JL. Diagnostic approach to chest pain in adults. UpToDate, accessed 10/2/09.

Renfrew, DL. Imaging of chest pain. Chapter 11 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.